

Recent Advances in Science in Western Australia

Earth Sciences

The Devonian carbonate rocks in the Geikie Gorge region have undergone a long and complex diagenetic history. Almost all primary porosity was destroyed by burial diagenesis in the Devonian-Early Carboniferous, accompanied by dolomitisation and secondary porosity development. Subaerial exposure during the Late Carboniferous and burial during the Permian-Cenozoic periods influenced karstification and calcite cementation, according to M W Wallace and associates working with the Geological Survey of WA:

Wallace M W, Kerans C, Playford P E, & McManus A 1991 Burial diagenesis in the Upper Devonian reef complexes of the Geikie Gorge region, Canning Basin, Western Australia. *Bulletin of the American Association of Petroleum Geologists* 75:1018-1038.

A J Mory of the WA Geological Survey recognizes seven phases in the evolution of the offshore Bonaparte Basin, northwestern Australia: Cambrian-Ordovician interior sag, Silurian-Early Devonian trough infill, Late Devonian-Carboniferous northwest-trending rifting, Permian-Carboniferous interior sag, latest Permian-Jurassic trough infill, Late Jurassic-earliest Cretaceous northeast-trending rifting and continental breakup, and Cretaceous and Cainozoic trailing-edge marginal sag:

Mory A J 1991 Geology of the offshore Bonaparte Basin northwestern Australia. Western Australia Geological Survey, Report 29.

Plio-Pleistocene events in the coastal deposits of the Carnarvon and Perth Basins are recorded by G W Kendrick and associates of the WA Museum and the University of WA. In the Perth Basin deposition of Pliocene to Early Pleistocene siliciclastic sediments in shoreline, inner shelf and regressive dune facies ended with a major regression and significant faunal extinction. Bioclastic carbonates characterise the Middle and Late Pleistocene in both basins and contain evidence of sub-tropical events including a southerly expansion of warm-water corals, suggesting a strengthening of the Leeuwin Current:

Kendrick G W, Wyrwoll K H, & Szabo B J 1991 Pliocene-Pleistocene coastal events and history along the western margin of Australia. *Quaternary Science Reviews* 10:419-439.

The Ashburton Basin is an arcuate belt of Proterozoic low-grade meta-sedimentary and meta-volcanic rocks flanking the southern and western margins of the Pilbara Craton, report A M Thorne and D B Seymour of the WA Geological Survey. Following continental rifting and breakup of the Pilbara Craton about 2.8-2.7 Ga, a phase of sedimentation occurred, represented by the upper Fortescue, Hamersley, Turee Creek and lower Wyloo Groups. This was followed by continental crustal collision between 2.0-1.7 Ga (the Capricorn Orogeny) and subsequent deformation and sedimentation 1.7-1.5 Ga:

Thorne A M & Seymour D B 1991 Geology of the Ashburton Basin Western Australia. Western Australia Geological Survey, Bulletin 139.

Continuous sedimentation occurs across the boundary between Frasnian and Famennian reef platforms in the Canning Basin. M R House of the University of Southampton and colleagues in the Geological Survey of WA find no evidence for meteorite or bolide impact events at this boundary - the previously-reported iridium anomaly post-dates the Frasnian/Famennian boundary and was formed by cyanobacterial concentration. Several sea level changes occur in the boundary beds. One regression event may correspond to the latest Frasnian sea level regression as observed elsewhere in the world:

Becker R T, House M R, Kirchgasser W T, & Playford P E 1991 Sedimentary and faunal changes across the Frasnian/Famennian boundary in the Canning Basin of Western Australia. *Historical Biology* 5:183-196.

Life Sciences

Parrots are not only a spectacular part of the fauna of arid Australia, but also have among the lowest reported water economies (ratio of evaporative water loss to metabolic rate) reported for desert-adapted birds. J B Williams of the University of Cape Town, South Africa, and co-authors from the University of WA found that a variety of species of parrots maintain a high metabolic rate whilst conserving water. This contrasts with other desert birds which have low metabolic rates to reduce water loss and conserve energy:

Williams J B, Withers P C, Bradshaw S D & Nagy K A 1991 Metabolism and water flux of captive and free-living Australian parrots. *Australian Journal of Zoology* 39:131-142.

The Diamond Dove is well adapted physiologically to life in arid and semi-arid mulga regions of central and western Australia. Despite its small size (the second smallest dove on record), it tolerates high body temperatures and relies on gular flutter to evaporatively cool when heat-stressed, according to E Schleucher and R Prinzinger of the Johann Wolfgang Goethe-University, Germany, and P C Withers at the University of WA:

Schleucher E, Prinzinger R & Withers P C 1991 Life in extreme environments: investigations on the ecophysiology of a desert bird, the Australian Diamond Dove (*Geopelia cuneata* Latham). *Oecologia* 88:72-76.

The fungus (*Phomopsis leptostromiformis*) that causes lupinosis in sheep grazing lupin stubbles infects lupin plants throughout the growing season but normally does not grow and produce toxins in plant tissue until after the plants die. P M Williamson and colleagues (University of WA and WA Department of Agriculture) report that these latent infections in living plants are arrested between the epidermis and the cuticle with the production of a unique coralloid mycelium. These structures were absent or much reduced in size on a breeder's line with high field resistance to *Phomopsis* stem blight:

Williamson P M, Sivasithamparam K, & Cowling W A 1991 Formation of subcuticular coralloid hyphae by *Phomopsis leptostromiformis* upon latent infection of narrow-leaved lupins. *Plant Disease* 75:1023-1026.

Note from the Hon Editor: This column needs your contributions! "Recent Advances in Science in Western Australia" may include papers that have caught your attention or that you believe may interest other scientists in Western Australia and abroad. This column helps to link the various disciplines and inform others of the broad spectrum of achievements of WA scientists (or others writing about WA). It is not intended to be an elite list of major advances. Members or non-Members of the Royal Society of Western Australia are encouraged to submit short (2-3 sentence) summaries of recent papers by Western Australian scientists or others writing about Western Australia, together with a copy of the title, abstract and authors' names and addresses, to the Hon Editor or a member of the Publications Committee: Dr S D Hopper (Life Sciences), Dr A E Cockbain (Earth Sciences), and Assoc Prof J Webb (Physical Sciences). Final choice of articles is at the discretion of the Hon Editor.

"Letters to the Editor" are also published at the discretion of the Hon Editor. Please submit a word processing disk with letters and suggest potential reviewers or respondents to your letter. *W A Cowling, Hon Editor, Journal of the Royal Society of WA.*

Honorary Members, Honorary Associate Members and Medallists of the Royal Society of Western Australia

Honorary Members (18)

[Rule 11d of the Constitution: The Society...may...admit as Honorary Members persons distinguished in Science or as patrons thereof,...the number of such members shall not exceed 25]

| | Name | | Date Admitted to Ordinary Membership | Date Admitted to Honorary Membership |
|------|-------|-----------|--|--|
| Miss | A M | Baird | 1928 | 1973 |
| Dr | J S P | Beard | 1962 | 1990 |
| Mr | G H | Burvill | 1929 | 1973 |
| Mr | W H | Cleverly | 1938 | 1982 |
| Mr | S J | Curry | 1966 | 1989 |
| Dr | J J E | Glover | 1956 | 1982 |
| Prof | B J | Grieve | 1948 | 1975 |
| Mr | A B | Hatch | 1958 | 1982 |
| Dr | E P | Hodgkin | 1946 | 1975 |
| Mrs | C F H | Jenkins | 1933 | 1965 |
| Mr | C F H | Jenkins | 1929 | 1973 |
| Dr | L E | Koch | 1958 | 1989 |
| Prof | A R | Main | 1951 | 1982 |
| Dr | D | Merrilees | 1959 | 1979 |
| Prof | R T | Prider | 1932 | 1976 |
| Mr | G G | Smith | 1951 | 1979 |
| Prof | Curt | Teichert | 1938 | 1975 |
| Mr | S E | Terrill | 1928 | 1973 |

Honorary Associate Members (2)

[Rule 11e of the Constitution: The Society...may...admit as Honorary Associate Members persons interested in Science,...the number of such members shall not exceed 25]

| | Name | | Date Admitted to Ordinary Membership | Date Admitted to Honorary Associate Membership |
|-----|------|-------|--|--|
| Mrs | H E | Balme | 1980 | 1989 |
| Dr | W F | Cole | 1939 | 1989 |

Medallists (16)

[Rule 62 of the Constitution: A medal shall be awarded...every fourth year...for distinguished work in science connected with Western Australia]

| | Name | | Year Awarded Medal |
|---------|--------|-----------|--------------------|
| Dr | W J | Hancock | 1924 |
| Dr | E S | Simpson | 1929 |
| Mr | W M | Carne | 1933 |
| Mr | G | Maitland | 1937 |
| Prof | E de C | Clarke | 1941 |
| Mr | L | Glauert | 1941 |
| Mr | C A | Gardner | 1949 |
| Dr | H W | Bennetts | 1955 |
| Prof | E J | Underwood | 1959 |
| Mr | C F H | Jenkins | 1966 |
| Prof | R T | Prider | 1970 |
| Prof | R M | Berndt | 1979 |
| Em Prof | B J | Grieve | 1979 |
| Dr | D L | Serventy | 1979 |
| Dr | J S P | Beard | 1983 |
| Em Prof | C A | Parker | 1986 |